

An Analysis for Simultaneous Heat and Mass Transfer in a Pneumatic Dryer

L. A. Shah^a and D. R. McGaw^b

^a Caribbean Industrial Research Institute, Trinidad and Tobago, West Indies

^b Department of Chemical Engineering, University of the West Indies, St Augustine, Trinidad and Tobago, West Indies

Abstract: *The pneumatic dryer consists basically of a tube along which hot air is passed at such a rate that it can carry along with it the particles requiring to be dried. During the passage of the particles along the dryer, heat is transferred from the air to the particles and evaporation of moisture takes place from the particle surface. The residence time in this type of dryer is small, generally of the order of seconds, thus making it more suitable for drying materials in which the moisture is mainly on the surface of the particles. In this paper, an analysis is presented for simultaneous heat and mass transfer in a pneumatic dryer. The analysis can be used, either as a basis for determining the length of dryer necessary for a given drying load, or to determine the mass transfer coefficient for a particular set of conditions from appropriate experimental measurements. It was applied to the specific case for the pneumatic drying of granulated sugar and correlations are presented for both the heat and mass transfer coefficients, these being determined from measurements on an experimental dryer.*

Keywords: *Heat and mass transfer, simultaneous, coefficients, pneumatic dryer*